Measuring Inclusive Instruction at German Universities:
Extending Validity Evidence

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Abstract

Promoting the use of inclusive instruction based on the tenets of Universal Design has occurred in the United States over the past three decades. In this study, a validated measure of university faculty attitudes toward inclusive instruction was translated from English to German and administered to a sample of faculty at a German institution. Responses (*n*=589) were subjected to an exploratory and confirmatory factor analysis in order to validate the translated items. The exploratory factor analysis yielded seven factors, which were very similar to the English version of the measure. The confirmatory factor analysis indicated the seven-factor solution showed acceptable model fit. Implications are discussed for universities both in the United States and abroad.

Keywords: higher education, university faculty, attitudes, international, universal design, inclusive instruction

Across the globe in colleges and universities today, undergraduate enrollment is more diverse than ever, and specifically with regard to students with disabilities (National Center for Education Statistics, 2017). As a result, many college faculty now use a variety of inclusive teaching practices to meet the needs of diverse students (Lombardi et al., 2018). For nearly three decades, Universal Design (UD) has been proposed as a conceptual underpinning to inclusive instruction in the context of higher education and disability, and diversity more broadly. Efforts to define and operationalize inclusive instruction grounded in UD, as well as to build faculty awareness of such practices, continue to persist in the literature (e.g., Faggella-Luby et al., 2017; McGuire, 2014). Although some studies focus on measuring inclusive instruction among faculty, very few of these studies are multi-institutional. In fact, lack of scaling-up to multi-institutional research designs remains a major limitation to these types of studies in the U.S..

The purpose of this study was to apply use of a psychometrically valid measure of university faculty inclusive instruction to an international context. Specifically, a larger movement in Germany to promote inclusive instruction offered the opportunity to study faculty attitudes toward disability and teaching practices more closely. As such, a measure that was previously developed in the United States was translated into German and administered to faculty across universities in Bavaria, the southern region in Germany. In this study, we describe the efforts to measure inclusive instruction, including validating the measure in German based on a sample of faculty at one German university, as well as describe some initial findings about inclusive higher education in Germany.

Measuring Inclusive Instruction

In the United States, the concept of Universal Design is well established as an underpinning to university teaching. Arguably, the two most prominent variations of the original framework from the field of Architecture are Universal Design for Instruction (UDI) (McGuire et al., 2003) and Universal Design for Learning (UDL) (Rose et al., 2006). These frame-

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works are meant to aid faculty in promoting maximum usability and accessibility in the planning, delivery, and evaluation stages of instruction. Ultimately, the various UD frameworks promote *inclusive* instructional practices.

European Context

By ratifying the United Nations Convention of the Rights of Persons with Disabilities (CRPD) in March 2009, the Federal Republic of Germany committed itself to create an inclusive education system in order to provide people with disabilities equal access to the university system. Within European countries, the number of students with disabilities (SWD) and a resulting student hardship has increased in recent years from 7% to 11% (Middendorff et al., 2013; Middendorf et al., 2017).

The attitudes of university faculty are seen as a key success factor in this regard (Ahmmed et al., 2012; Boyle et al., 2013). The attitude of university faculty toward SWD has a significant impact on students' academic success (Garrison-Wade, 2012). Negative attitudes and perceptions are the biggest barrier for SWD, such as the frequent use of stereotypes (Baker et al., 2012). Insufficient knowledge and disability awareness (Burgstahler & Moore, 2009) may lead to prejudices and negative attitudes among faculty toward SWD, which may, in turn, negatively impact SWD experiences in college courses.

A lack of faculty awareness of disability sometimes even results in the questioning of the impairment (Leake & Stodden, 2014). This mainly affects students with non-visible impairments, who comprise as much as 94% of the SWD population in Germany (German Student Information, 2013), and who report among others about the lack of acceptance for needed accommodations. In general, it is difficult for college faculty to determine appropriate accommodations (Vogel et al., 2008), so that only easy-to-implement adjustments are granted (Becker & Palladino, 2016). "Inadequate" also describes the level of knowledge of the teachers with regard to legal requirements in the interests of those affected students (Moriña, 2017). Faculty also may not be familiar with the different types of disabilities (Vogel et al., 2008), and disability support services offered by the university are quite varied across institutions (Burgstahler & Moore, 2009).

Furthermore, there seem to be differences in disability awareness among faculty that may depend on their respective disciplines. For example, faculty from the humanities and economics fields are not as aware of inclusive instruction than faculty from colleges of education specifically (Becker & Palladino, 2016).

Typically, university faculty are not trained in inclusive instruction (Faggella-Luby et al, 2017; Lombardi et al., 2018). A thematic training would be necessary to bring about changes in attitudes and thus in the behavior of the faculty, which, in turn, may have a positive effect on the interaction of these with the SWD (Zhang et al., 2010). In order to design such training opportunities, it is first important to reliably and validly measure faculty attitudes and perceptions toward disability and inclusive instruction. As such, the purpose of the current study was to validate a translated measure of faculty inclusive instruction in order to reliably and validly use at German universities.

Method

Sample

The sample was composed of 589 faculty (response rate was approximately 21%) at one university. Most of the respondents were teaching at the Julius-Maximilians University Würzburg. Over half (60%) of the participants were male; most were under 51 years old (<35J: 42.4%, 36-50y: 34.8%, 51-65y: 22.2%,> 65y: 0.5%) and had been teaching for 10 years or more (41.1%). There were 58.4% of the respondents who were employed on a temporary basis, mainly as scientific staff (52.5%). This sample is considered representative, although there is an over-representation of the humanities and catholic theology as well as an underrepresentation of medicine. With 63.1%, the courses of the respondents are listed as compulsory subjects for undergraduate students (45%).

Measure

A validated measure of inclusive instruction, the Excel questionnaire (Lombardi et al., 2011) was used in the current study. The instrument consists of three sections. First, demographic data were collected; second, the use of topic-specific training was addressed; and third, 39 items were used to analyze the attitudes and perceptions of faculty members towards SWD. The 39-item Excel survey measures attitudes toward accommodations, disability-specific laws and inclusive instruction, and is based on eight factors that account for 60% of the variance. Cronbach's alpha of all items is 0.88 (Lombardi et al., 2011). More recently, the measure was further developed and refined and renamed into the Inclusive Teaching Strategies Inventory (ITSI) (Lombardi et al., 2011). Consistent with previous versions, a six-point Likert response scale was used, ranging from 1 = "strongly agree" to 6 = "strongly disagree."

German translation. The instrument was translated into German using the technique of Banville et al. (2000). The items were adapted after a back and forth translation of the German usage and the Bavarian university system.

In the demographic part, "diverse" was added as the third choice for gender, while the answers to the employment relationship were reduced to "permanent" and "temporary." The open questions about age and duration of employment as a teacher have been converted into closed questions. The area of further education was also revised and supplemented with further training topics that could be of interest to teachers according to previous studies. Furthermore, in the original questionnaire, a question asked about training, including further education and self-taught further education. This subdivision was taken up in the German version in two separate issues.

The third set of items was subject to validation, which was the purpose of the current study. With regard to translation, items that referred to laws were changed in accordance with the European Union and German context. In addition, the sequence of the items, which had previously been designed according to factors, was arranged randomly. As such, a major goal of the current study was to determine whether the original factor structure could be confirmed in the Bavarian context and translated into German.

Procedures

Prior to the large sample data collection, the translated items underwent a pilot phase. The pilot study was attended by 23 instructors from different disciplines of one university. Furthermore, the items were presented to experienced university staff from the field of empirical educational research. Corresponding to the results, a few linguistic changes and ambiguous terminology were clarified for better comprehensibility. In particular, the term "disability" was addressed in remarks by pilot test respondents. It was difficult to come to an agreement on one term that encompassed the diverse array of disability types. This problem was also reflected in a related qualitative study, where in one-on-one interviews, instructors synonymously referred to the term "disability," "impairment" or, for example, also "handicap" (Hoos et al., 2020). In addition, disorders such as dyscalculia or dyslexia were often referred to as "learning disability/impairment." Therefore, to encompass all disability types, the foreword to the questionnaire stated that SWD refers to students with physical, mental, and chronic disabilities as well as learning disabilities.

After the pilot phase, the revised measure was administered using the online provider SoSci Survey, which was free of charge for scientific researchers who collected the data. To participate, instructors were invited by email, sent on behalf of the respective disability officer and the university management. Standardized text was made available to the universities for the invitation emails and the reminder email.

Data Analysis

The pilot phase was conducted with 23 participants. In the validation phase (n=589), an exploratory factor analysis (EFA) and a confirmatory factor analysis (CFA) was conducted. All analyses were conducted with SPSS Statistics 25 and R (3.3.3). With regard to data selection, all cases with missing data from 30% and from 30% missing values in the last part (39 items) were excluded from the analysis (Graham, 2012). Missing values of the variables were replaced by averages because on average only 2% (Range: 0% -12%) of the information was missing (Little & Rubin, 2002).

For the EFA, the purpose is to reduce items through a smaller number of factors. The extent to which data was suitable for a factor analysis was given by the Kaiser-Meyer-Olkin Criterion (KMO), which should assume a value above .5 (Cureton & Agostino, 1983). The extraction took place via the KMO criterion, the examination of the Scree plot and a parallel analysis. To ensure optimal consistency and stability of the factor structure, various rotation methods (Varimax, Oblimin, and Maximum Likelihood) were compared. The original study used the Oblimin (0.4) rotation method (Lombardi & Murray, 2011). Items that were ambiguously loaded on different factors and with loadings under .3 were excluded.

The resulting model was compared to the original model by means of a confirmatory factor analysis (CFA), which is typically used to study the nature and relationship of latent variables (Jackson et al., 2009). To assess the global quality and acceptance of the model, standard indexes were considered for CFA (Hu & Bentler, 1999). These include the smallest possible chi square to degrees of freedom ratio, or χ^2/df, with a value between 2 and 5 (Seifried & Heyl, 2016). Furthermore, the following indices with corresponding cut-off values were accepted as suitable measures for considering the global quality: Comparative Fit Index (CFI) of .90 or higher, Root Mean Square Error of Approximation (RMSEA) and Standardized Root Mean Square Residual (SRMR), both of which should be .08 or lower, as well as the Akaike Information Criterion (AIC) and Consistent Akaike Information Criterion (CAIC) with the lowest possible values (Browne & Cudeck, 1992; Hu & Bentler, 1999, Seifried & Heyl, 2016). To check the measure-

ment model, Cronbach's alpha was calculated for the factors and for all items in the inter-item correlations (.30; Bortz & Döring, 2002) and the corrected item scale correlations (.30; Blanz, 2015). In terms of discriminant validity, the factorial delays and the variance extracted per factor were calculated (Seifried & Heyl, 2016).

Results

With SWD, most instructors have had contact (63.5%) in teaching during the past five years, with 50.7% specifying this to be 1-5 SWD. Nevertheless, 41.9% of the participants stated that they had not yet had any personal experience with the topic of disability. Almost the same number (42.5%) said they already had experience with family members, friends, or personal contacts. Further, 18.3% of respondents had experience teaching SWD and 4.8% reported having an impairment themselves.

The second set of items pertained to interest in further training on specific disability-related topics. Results showed that instructors were particularly interested in the topic of mental illness, while other specific types of disabilities were ranked lower. In addition, 9% of the participants had already attended subject-specific training, most of them (35%) continued between 4 and 6 hours. A quarter of all faculty learned about the topic mainly through websites (77%), investing between one and three hours of their time.

With regard to the EFA results, according to the KMO criterion, the extraction provided nine factors. However, two were only slightly above 1 (eigenvalue F9: 1.07, eigenvalue F8: 1.09), and therefore all methods were also performed with preset 7, 8 and 9 fixed factors. The Scree plot and parallel test indicated seven factors. The strongest factor loadings were found by the Oblimin method (0; 4), so that was used for further analysis. In addition, this rotation method was also used in the original study. Here, with 59.7% of variance explained the factor structure could be considered reproducible. However, factors eight and nine showed latent features that were not interpretable because each had only two items. In addition, individual factorial reliability proved to be insufficient, which resulted in a factor structure of seven reproducible factors, loading at least with three items (charge at three items over .5) and showing a reliability between, in a case .60, otherwise .68 and .89. The explained variance per factor was between .5 and .66. All items from the 8th and 9th factors were redistributed in the seven-factor solution, except for item 15 ("I prefer the use of different teaching methods, including work in small groups and hands-on activi-

ties."), which did not cross-load on another factor and was therefore eliminated. In the seven-factor solution, 54.1% of the total variance was explained and all remaining variables showed a Cronbach's alpha of .91. The values of the corrected item scale correlation were occasionally at .3, but mostly between .5 and .79 and therefore adequate. On average, the inter-item correlation was above .3, except for one factor which also showed the lowest reliability. Based on this structure, the determined factors were: (a) support for accommodations, (b) knowledge of disability, (c) willingness to invest time to learn about inclusive instruction, (d) accessibility of (course) materials, (e) performance expectations, (f) support services and, (g) willingness to adjust to course performance and requirements. Importantly, these factors were quite similar to the original factors in the English version of the Excel survey (Lombardi & Murray, 2011).

Table 1 shows descriptive statistics and reliability by factor for both the original English version and the translated German version of the instrument. As shown in the table, the factor names were closely translated in the German version, although some were not exact translations. Table 2 shows the CFA results, of which all reported fit indices show acceptable to good model fit (Browne & Cudeck, 1992; Hu & Bentler, 1999) for all seven-, eight- and nine-factor solutions, with the seven-factor model showing the best model fit.

Discussion

In this study, we examined the psychometric properties of a translated version of the Excel survey, a measure of university faculty attitudes toward inclusive instruction. The Excel survey was previously validated in English (Lombardi & Murray, 2011) and has since been revised several times and used at various universities in the United States and abroad (Lombardi, Murray, & Dallas, 2013; Lombardi et al., 2011; Lombardi et al., 2015). The results of this study are particularly noteworthy because it is the first examination of the Excel survey in German. Results show that the translated instrument is reliable and valid and should be used with confidence in German-speaking contexts.

The Excel survey, which was later renamed the Inclusive Teaching Strategies Inventory (ITSI), is an important component of data-based decision making. Disability services providers can use the instrument to gain a better sense for gaps of knowledge in faculty on their campus. This type of data is valuable for faculty training and outreach efforts. There are numerous examples of such previous efforts in the

Table 1

Descriptive Statistics and Reliability for English and German versions of the Excel Survey

Factor (English)	Factor (German)	English			German		
		α	X	σ	α	X	σ
Fairness in the provision of accommodations	Support for accommodations for SWD	.85	5.09	.63	.89	4.71	.72
Knowledge in the context of disability	"…"	.82	3.30	1.08	.86	2.92	1.09
Willingness to invest time	Willingness to invest time to learn about inclusive teaching	.74	4.75	.83	.70	3.78	.99
Accessibility of course-materials	"…"	.69	4.81	.79	.77	4.87	.88
Performance expectations	"…"	.65	4.96	.63	.60	4.72	.73
Campus resources	Support services	.69	4.24	.82	.68	3.79	.90
Adjustments to course and performance requirements	willingness to adjust to course and performance requirements	.78	3.86	.85	.75	4.67	.80
Minimizing barriers	-	.70	4.29	.94	-	-	-

Table 2

Confirmatory Factor Analysis Results

	χ²/df	CFI	RMSEA	SRMR	AIC	CAIC
original model	2.9	.83	.063	.075	2179.497	-2868.682
modified model, 9 factors	2.8	.84	.061	.068	2113.864	-2908.323
modified model, 8 factors	2.9	.83	.063	.070	2083.986	-2709.445
modified model, 7 factors	2.8	.84	.062	.068	1932.948	-2633.727

Note. χ^2/df: Chi-square value to degrees of freedom ratio; CFI: Comparative Fit Index; RMSEA: Root Mean Square Error of approximation; SRMR: Standardized Root Mean Square Residual; AIC: Akaike information criterion; CAIC: Consistent Akaike Information Criterion.

United States, such as recent findings that show faculty attitudes towards adopting inclusive instruction can improve after receiving disability-related training (Lombardi & Murray, 2011; Lombardi et al., 2011; Murray et al., 2009; Murray, et al. 2014; Murray et al., 2010). Unfortunately, despite the promise of these findings, higher education institutions continue to report barriers of universal design implementation due to limited staff resources and minimal faculty interest (Raue & Lewis, 2011). Moreover, when faculty positively endorse aspects of inclusive instruction, these same faculty might not be implementing such practices (Cook et al., 2009; Lombardi, Murray, & Gerdes, 2011; Zhang et al., 2010). These findings suggest that faculty may understand the importance of inclusive instruction, yet may lack the time and resources to adopt such practices, which may affect their interest.

Previously, one study examined inclusive instruction among college faculty on an international scale, focusing on comparisons between the United States, Canada, and Spain (Lombardi, et al., 2015). In the current study, German faculty comprised the sample and only attitudes (not actions) were the focus of measurement. Yet, this study is the first to illustrate a snapshot of such attitudes among German faculty, and also provides further validity evidence for the instrument after translating the items. With a psychometrically valid instrument, German universities may consider surveying faculty to make data-based decisions on training opportunities and topics to be prioritized and provided in the future. Importantly, there are now effective Spanish and German translations of this measure.

The current study shows the language of inclusive instruction can be effectively translated into German. As previously mentioned, this current validity study was part of a larger effort to promote inclusive instruction at five universities in the southern German region of Bavaria. After validating the survey in German, data were collected at other German universities for this purpose. An important next step will be for German researchers and higher education administrators to translate resources that support facilitation of inclusive instruction beyond the Excel survey. With regard to faculty training opportunities, Lombardi et al. (2018) describe four specific teaching tools that promote inclusive instruction, which address syllabus design, course mapping, lecture, and assessment. Resources like these should be translated into German to further promote inclusive instruction.

Ultimately, SWD in higher education are increasing in the United States and abroad. As such, promoting inclusive instruction among college faculty is a critical global need. Surveying faculty about their teaching practices is an important first step to identify gaps in knowledge and to prioritize future trainings. The current study shows the Excel survey items function similarly in English and German, and as such, German universities should feel confident in using the survey.

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